Sandia National Laboratories

Red-Emitting Phosphors for Solid-State Lighting

Summary

Sandia has developed red-emitting phosphors that will help to transform the cold blue of many current light-emitting diodes (LEDs) into the warm white that is preferred for general lighting. This advance could help move solid-state lighting (SSL) into broader applications and market spaces. This class of rare-earth doped tantalates has unprecedented compositions and structures as well as excellent characteristics for a red-phosphor component for blue or UV excitation. Some compositions and phases are formed as nanoparticles, which are advantageous for minimal emission loss due to scattering. These phases and nanoparticle forms can only be obtained by this invention.

The solid-state devices that have been targeted by this technology produce light in the blue to yellow portion of the visible spectrum, which means that orange or red objects appear dim and colorless under this lighting. In order to improve white light quality, devices need to be equipped with these red-emitting phosphors that can be excited by blue LEDs as developed by Sandia.

BENEFITS

- Improved white light quality
- Unprecedented red-phosphor component for blue or UV excitation
- Reduces the need for stringent emission wave-length control of the LEDs
- Increases the absorption cross section of the phosphor
- Exceeds traditional LED color quality
- Improved energy efficiency

APPLICATIONS

- Electronics
- Solid-state lighting
- Photocatalysis
- Ion conducting

U.S. PATENTS PENDING ON SD#

- 11392

INTELLECTUAL PROPERTY & LICENSING CONTACT

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Licensing & Partnering Status:

Various license and partnering options are available. Please contact the Intellectual Property department to discuss.

Technology Readiness Level:

Sandia estimates this technology's TRL at approximately level 3-4. Active research and development has been initiated and laboratory-based studies are being conducted for proof-of-concept validation.

National Nuclear Security Administration

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